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## The genus *Pullimosina* Roháček (Diptera, Sphaeroceridae) from Japan

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**Abstract:** The Japanese species of the genus *Pullimosina* Roháček are studied. *Pullimosina heteroneura* (Haliday, 1836) is the only species formerly recorded, and 4 other species are newly recorded from Japan. Two new species, *P. ryukyuensis* and *P. vernalis* are described and illustrated. *Pullimosina pullula* (Zetterstedt, 1847) and *P. vulgesta* Roháček, 2001 are recorded from Japan for the first time. A key to the Japanese species of *Pullimosina* is presented.

Key words: *Pullimosina*, new species, new records, Japan, Sphaeroceridae, Diptera

### INTRODUCTION

The genus *Pullimosina* was established by Roháček (1983), and recorded from all zoogeographical regions. According to Roháček et al. (2001), twenty-five species were known, but the knowledge on this genus is still much poor except for Europe and North America. The members of this genus are associated with decaying vegetable matter, and some species are known to be synanthropic.

In Japan, only one species, *P. heteroneura* (Haliday, 1836) was recorded (Hayashi, 1986a, 1986b). I studied the Japanese material of this genus, and found 5 species, of which 2 species were new to science, and 2 species were new to Japan.

The specimens examined in this study including type series are preserved in the Reference Museum, Department of Medical Entomology, National Institute of Infectious Diseases, Tokyo (NIID).

**Genus *Pullimosina* Roháček, 1983**  
(Japanese name: Karekusa-funkobae-zoku)

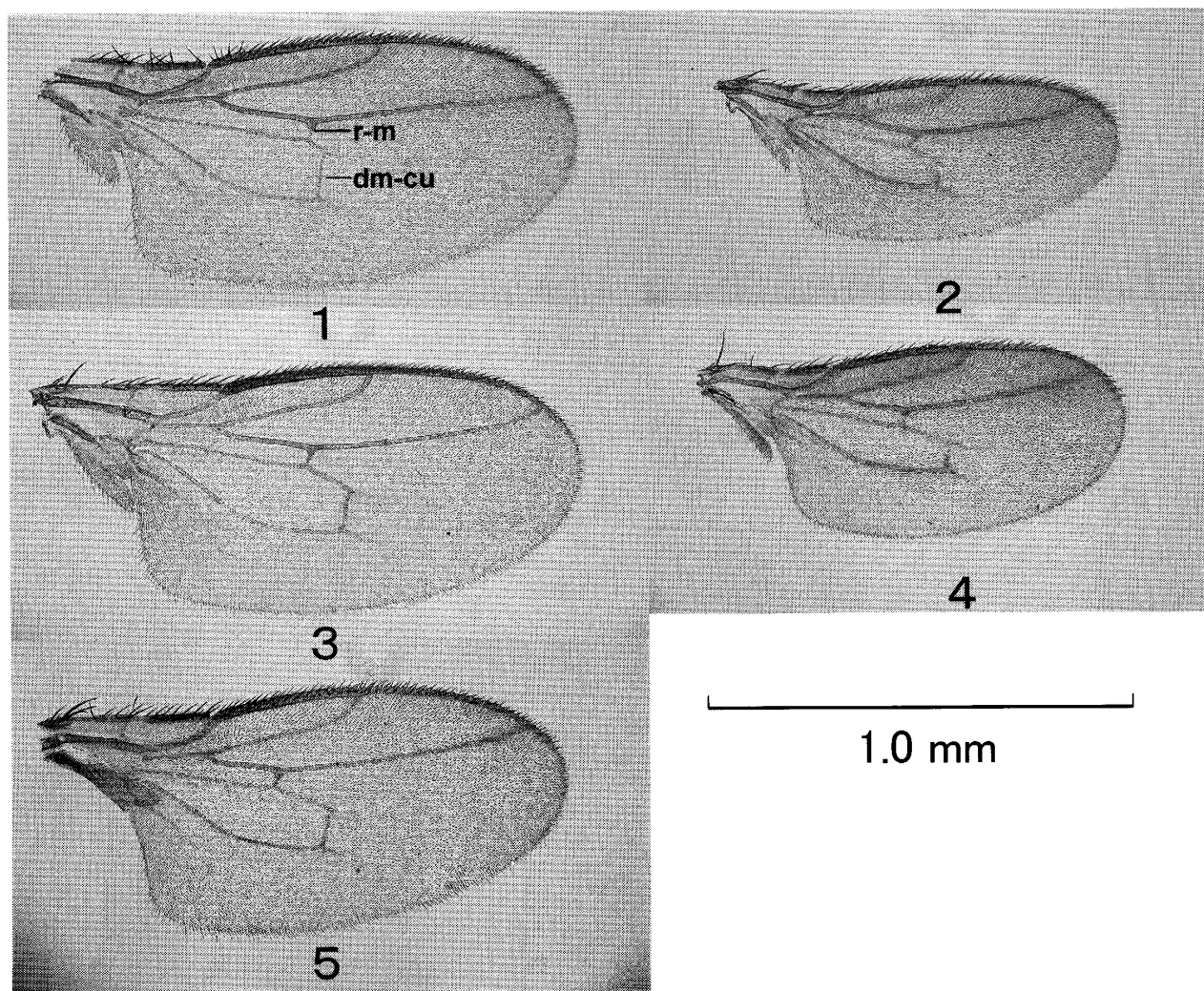
*Pullimosina* Roháček, 1983: 98.

Type species: *Limosina heteroneura* Haliday, 1836 (original designation).

The genus is distinguishable from the other genera of the subfamily Limosininae by the following characters: Anepisternum and katepisternum without shining areas; scutellum rounded triangular, without microsetae on disc; costa overpassing far beyond  $R_{4+5}$ ;  $R_{4+5}$  more or less up-curved to C; hind corner of discal cell not rounded and  $M_{1+2}$  and  $M_{3+4}$  present; epandrium with a long dorsolateral seta; alula small and narrow; spectacles-shaped sclerite (internal sclerotization of the vagina) well developed.

### Key to the species of *Pullimosina* from Japan

1. Distance between crossveins r-m and dm-cu much shorter than dm-cu (Fig. 1).....



Figs. 1-5. Wings of *Pullimosina* spp. 1: *Pullimosina heteroneura* (female); 2: *P. pullula* (female); 3: *P. ryukyuensis* sp. nov. (male paratype); 4: *P. vernalis* sp. nov. (male paratype); 5: *P. vulgesta* (male).

- ..... *P. heteroneura* (Haliday)
- Distance between crossveins r-m and dm-cu longer or almost as long as dm-cu (Figs. 2-5) ..... 2
- 2. Face brown to dark brown..... 3
- Face yellow to yellowish-brown..... 4
- 3. Fore coxa yellowish-brown; male mid tibia with a row of small spines (Fig. 6) ..... *P. ryukyuensis* sp. nov.
- Fore coxa dark brown; male mid tibia without spines..... *P. vulgesta* Roháček
- 4. Middle pair of *if* almost 1.5 times as long as other *if*; face yellowish-brown, somewhat translucent; spectacles-shaped sclerite (Fig. 21) weakly sclerotized; male sternite 5 (Fig. 17) with incision posteromedially and a pair of batches of small spines..... *P. vernalis* sp. nov.
- Middle pair of *if* almost twice as long as other *if*; face strongly yellowish; spectacles-shaped sclerite (Fig. 22) large and strongly sclerotized; male sternite 5 without incision and having several small spines on the posterior margin (male is unknown in Japan) ..... *P. pullula* (Zetterstedt)

***Pullimosina heteroneura*** (Haliday, 1836)  
(Japanese name: Usuiro-karekusa-funkobae)  
(Fig. 1)

*Limosina heteroneura* Haliday, 1836: 331.

**Diagnosis.** Body length 1.1–1.5 mm; general color dark brown; face brown; 3–4 *if*, almost same strength, not cruciate; fore coxa yellowish brown, legs brown to dark brown; distance between crossveins r-m and dm-cu much shorter than dm-cu (Fig. 1); abdominal syntergite 1+2 with a medial triangular pale pigmented area; male sternite 5 with a shallow incision posteromedially and having a pair of batches of small spines; surstylus not so densely setulosed.

**Specimens examined.** 1♂, Otofuke, Tokachi, Hokkaido, Aug. 11, 1982, T. Hayashi; 1♀, Nanae, Oshima, Hokkaido, Aug. 22, 1982, T. Hayashi; 1♀, Moroyama, Iruma-Gun, Saitama, July 29, 1986, T. Hayashi; 2♂, 6♀, ditto, May 25–28, 1988, T. Hayashi; 2♂, ditto, Mar. 25, 1989, T. Hayashi; 1♀, Hachioji, Tokyo, April 7, 1983, T. Hayashi; 1♂, ditto, May 18, 1984, T. Hayashi; 1♂, Imperial palace, Tokyo, May 20, 1996, T. Hayashi; 1♀, ditto, June 21, 1999, S. Shinonaga; 1♂, 1♀, Urayasu, Chiba, June 5, 1985, T. Hayashi; 5♂, 5♀, ditto, July 24, 1985, T. Hayashi; 1♂, 3♀, Lake Yamanaka, Yamanashi, Oct. 19, 1985, T. Hayashi; 1♀, Tosashimizu, 100 m, Kochi, April 27, 1998, T. Hayashi; 2♂, 3♀, Mt. Gokahara-dake, 1,050 m, Nagasaki, Mar. 25–April 23, 1992, H. Kurahashi; 1♀, Hikosan, Fukuoka, June 5, 1970, K. Kanmiya.

**Distribution.** Widespread in all zoogeographical regions.

**Remarks.** This species is easily distinguishable from the other Japanese congeners by the small distance between crossveins r-m and dm-cu (Fig. 1).

***Pullimosina pullula*** (Zetterstedt, 1847)  
(Japanese name: Kigao-karekusa-funkobae)  
(Figs. 2 and 22)

*Limosina pullula* Zetterstedt, 1847: 2498.

**Diagnosis of female.** Body length 1.2–1.7 mm; general color dark brown; lunule and face yellow to yellowish brown; 3 *if*, only middle pair strong, almost twice as long as other 2 *if*, cruciate; fore coxa yellow, legs yellowish brown to brown; wing (Fig. 2) narrow and yellowish brown, discal cell narrow, 2nd costal sector somewhat shorter than 3rd costal sector; abdominal syntergite 1+2 with a medial triangular pale pigmented area; spectacles-shaped sclerite (Fig. 22) large and strongly sclerotized; spermathecae disc-shaped.

**Specimens examined.** 1♀, Hiroo, Tokachi, Hokkaido, Aug. 29, 1995, T. Hayashi; 1♀, Sapporo, Ishikari, Hokkaido, Sept. 3, 2002, T. Hayashi; 6♀, Nanae, Oshima, Hokkaido, July 21–Aug. 22, 1982, T. Hayashi; 1♀, Kamikochi, Azumi-village, Nagano, June 24, 1988, T. Hayashi; 1♀, Moroyama, Iruma-Gun, Saitama, May 25, 1988, T. Hayashi.

**Distribution.** Europe, North America, Hawaii, New Zealand, Africa? and Japan (Hokkaido and Honshu).

**Remarks.** This species is known to be parthenogenic, and the occurrence of males is very rare (Roháček, 1983; Marshall, 1986). I could not find males of this species in this study. It is easily distinguishable by its large and strongly sclerotized spectacles-shaped sclerite (Fig. 22).

***Pullimosina ryukyuensis*** Hayashi, sp. nov.  
(Japanese name: Ryukyu-karekusa-funkobae)  
(Figs. 3, 6–13)

Description.

Body length 1.2–1.6 mm (holotype 1.3 mm).

Head: Generally dark brown; face and gena brown to dark brown; 3 *if*, only middle one strong, almost twice or more than twice as long as other 2 *if*, often cruciate; eye oval and large, its longest diameter about 6 times as long as smallest genal width; antenna dark brown; arista long, about 4 times as long as antenna, rather long pubescent.

Thorax: Dark brown, dusted, 1 *dc*; 5–6 irregular *ac* microsetae in front of suture, prescutellar *ac* enlarged; scutellum rounded triangular, somewhat wider than long, 2 *sctl*.

Wing (Fig. 3): Hyaline, veins light brown; second costal sector somewhat shorter than third sector;  $R_{4+5}$  moderately up-curved to C;  $r-m-dm-cu:dm-cu$  = about 1.2; discal cell broad; alula narrow and pointed; halter with dark brown knob and brown stem.

Legs: Mostly brown except for yellowish brown fore coxa and base of fore femur; male mid tibia (Fig. 6) with a row of small spines ventrally and without apicoventral seta; female mid tibia with an anteroventral seta on basal 3/5 and a strong apicoventral seta.

Abdomen: Syntergite 1+2 with a medial triangular pale pigmented area; male sternite 5 (Fig. 9) characteristic, posteromedial membranous area pigmented posteriorly, with many setae; epandrium (Fig. 7) with sparse short setae and a very long dorsolateral seta; surstylus (Fig. 7) with dense setae; ejaculatory apodeme distinct; paramere (Fig. 8) rather long and straight; female terminalia as in Figs. 10 and 11, epiproct wide, sternite 8 weakly sclerotized, cerci with 3 sinuate setae; spermathecae as in Fig. 12, having small projections on surface of apical concavity and the neck; spectacles-shaped sclerite (Fig. 13) weakly sclerotized.

*Holotype* ♂, Yona, Okinawa-honto I., Okinawa, June 29–30, 1993, T. Hayashi.

*Paratypes*. 1♂, Nagata, Yakushima I., Kagoshima, Mar. 25, 1999, T. Hayashi; 2♂, 5♀, Nishinakama, Amami-oshima I., Kagoshima, April 26–27, 1970, K. Kanmiya; 2♂, 2♀, Mt. Yuwan, Amami-oshima I., April 27, 1970, K. Kanmiya; 2♂, 5♀, Yona, Okinawa-honto I., Okinawa, June 29–July 2, 1993, T. Hayashi; 22♂, 19♀, ditto, Mar. 2–6, 1994, T. Hayashi.

*Etymology*. This species is named after its main distribution, “Ryukyu Islands”.

*Distribution*. Japan (Yakushima I., Amami-oshima I. and Okinawa-honto I.).

*Remarks*. This species is characteristic in having a row of small spines on male mid tibia ventrally among the congeners, but several undescribed Oriental species share this character, and they may form a distinct group. The structure of male sternite 5, which is strongly concave and has a posteriorly pigmented posteromedial membranous area, is also unique in this genus.

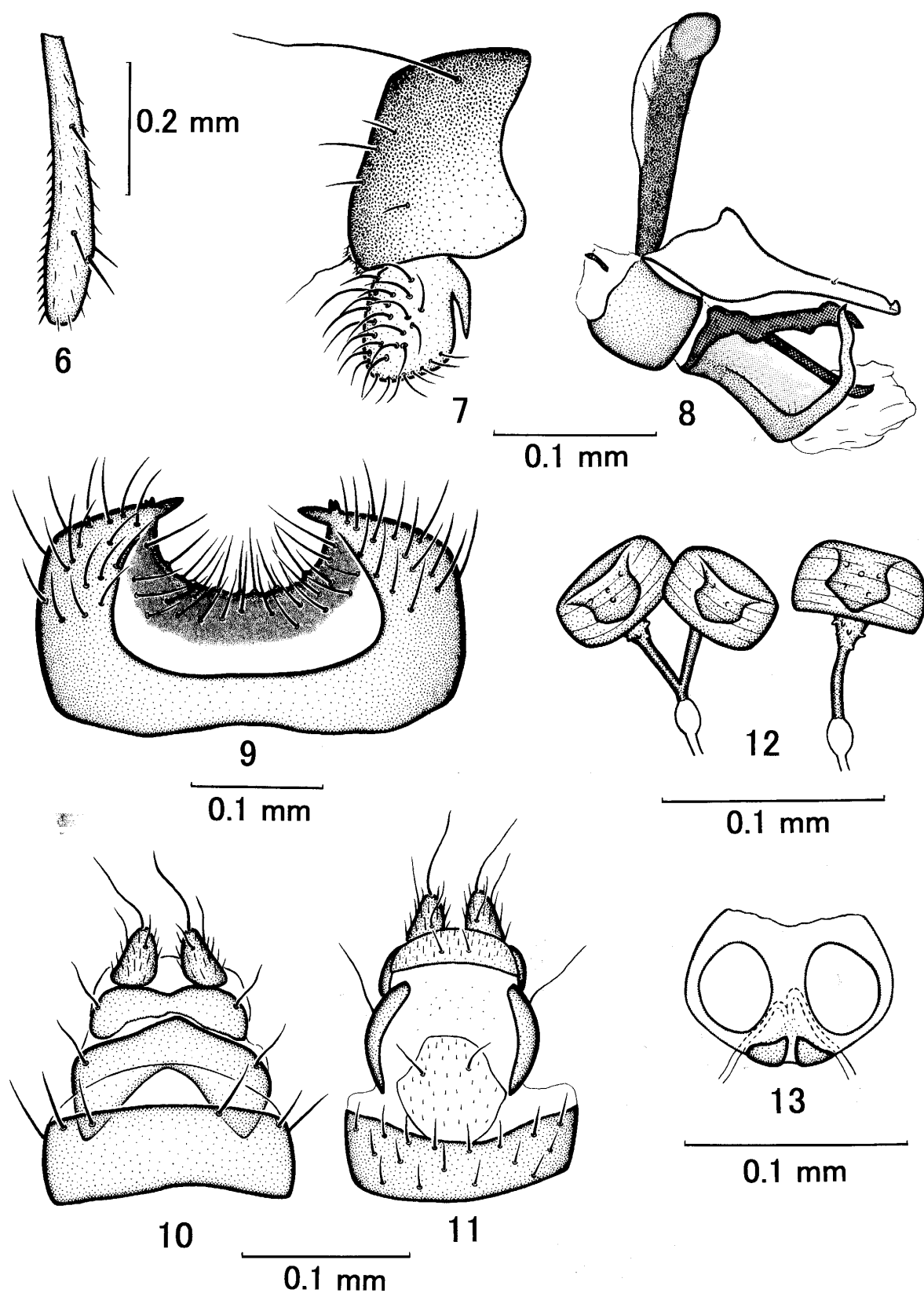
***Pullimosina vernalis*** Hayashi, sp. nov.  
(Japanese name: Haruno-karekusa-funkobae)  
(Figs. 4, 14–21)

Body length 1.1–1.5 mm (holotype 1.2 mm).

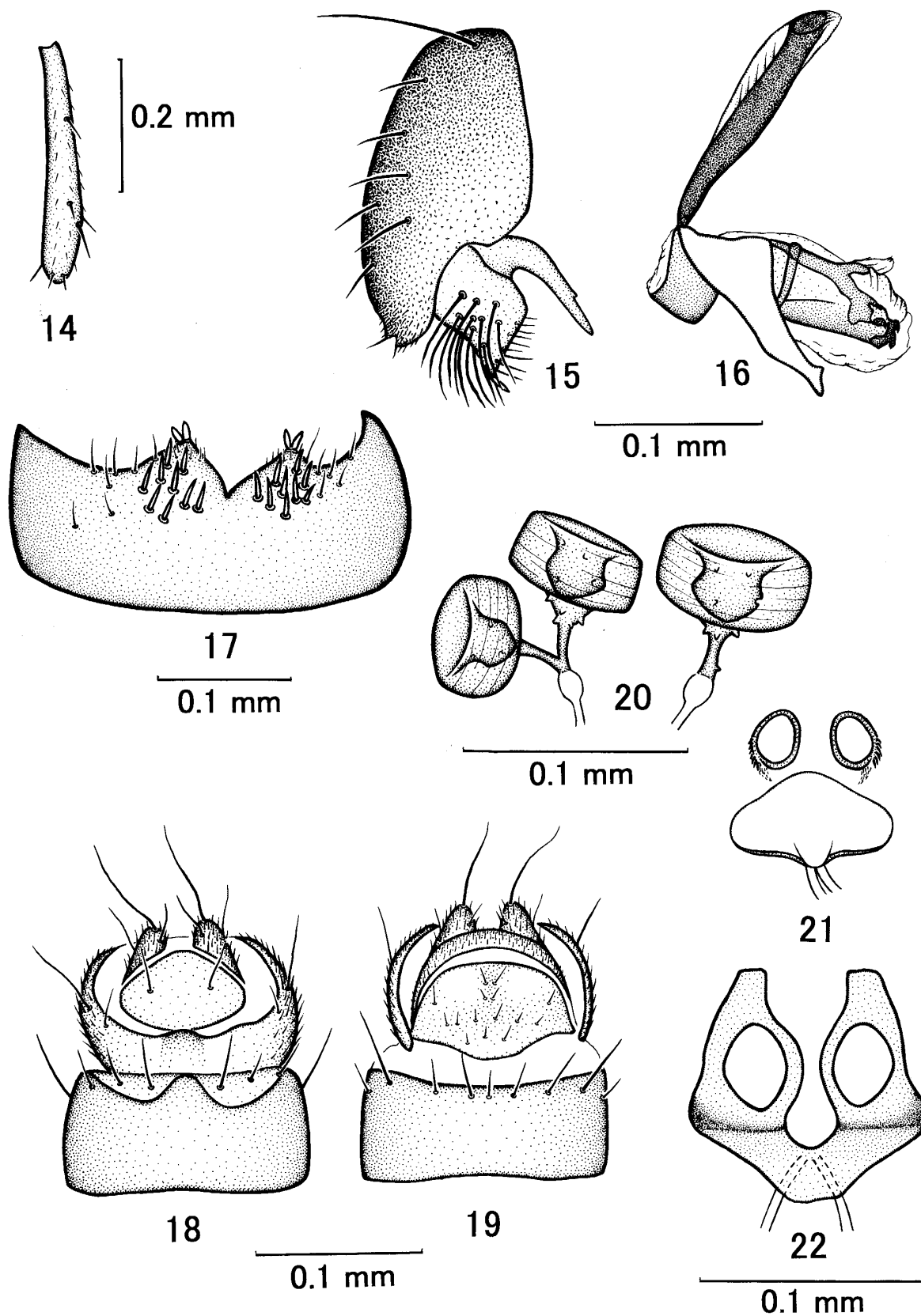
Head: Brown to dark brown, anterior part of frons, lunule and gena somewhat paler, face yellowish brown; 3 *if* rather strong, middle pair about 1.5 times as long as other 2 *if*, often cruciate; eye oval, its longest diameter about 5 times as long as smallest genal width; antenna dark brown; arista long, about 3.5 times as long as antenna, rather long pubescent.

Thorax: Brown to dark brown, rather shining; 1 *dc*, 4 irregular *ac* microsetae in front of suture, prescutellar *ac* somewhat enlarged; scutellum rounded triangular, somewhat wider than long, 2 *sctl*.

Wing (Fig. 4): Narrow, somewhat yellowish brown; veins brown; second costal sector almost as



Figs. 6–13. *Pullimosina ryukyuensis* sp. nov. 6: Male mid tibia, anterodorsal view. 7: Male terminalia, lateral view. 8: Male inner genitalia, lateral view. 9: Male sternite 5. 10: Female terminalia, dorsal view. 11: Ditto, ventral view. 12: Spermathecae. 13: Spectacles-shaped sclerite.



Figs. 14–21. *P. vernalis* sp. nov. 14: Male mid tibia, anterodorsal view. 15: Male terminalia, lateral view. 16: Male inner genitalia, lateral view. 17: Male sternite 5. 18: Female terminalia, dorsal view. 19: Ditto, ventral view. 20: Spermathecae. 21: Spectacles-shaped sclerite. 22: *P. pullula*, spectacles-shaped sclerite.

long as third sector;  $R_{4+5}$  moderately up-curved to C;  $r-m-dm-cu : dm-cu = 1.8-1.9$ ; discal cell narrow; alula narrow and pointed; halter with brown knob and yellowish brown stem.

Legs: Mostly yellow to yellowish brown, fore coxa pale yellow; male mid tibia (Fig. 14) without a row of spines ventrally, having a developed apicoventral seta; female mid tibia with an anteroventral seta on basal 3/5 and a strong apicoventral seta.

Abdomen: Syntergite 1+2 with a medial triangular pale pigmented area; male sternite 5 (Fig. 17) with incision posteromedially and a pair of batches of small spines; epandrium (Fig. 15) with sparse short setae and a long dorsolateral seta; surstylus (Fig. 15) strongly prolonged anteriorly, posterior part with numerous long setae; paramere (Fig. 16) somewhat boot-shaped; female terminalia as in Figs. 18 and 19, epiproct rounded triangular, sternite 8 weakly sclerotized, wider than long, cerci with 3 sinuate setae; spermathecae as in Fig. 20, having small projections on surface of apical concavity and the neck; spectacles-shaped sclerite as in Fig. 21, small and weakly sclerotized.

*Holotype* ♂, Moroyama, Iruma-gun, Saitama, Japan, May 25, 1988, T. Hayashi.

*Paratypes*. 9♂, 16♀, Moroyama, Iruma-gun, Saitama, May 14–31, 1988, T. Hayashi; 1♀, ditto, Mar. 4, 1989, T. Hayashi; 1♂, Hachioji, Tokyo, May 18, 1984, T. Hayashi.

*Etymology*. This species is named after the season in which type series were collected.

*Distribution*. Japan (Honshu).

*Remarks*. This species is related to *P. pullula* in Japan, but is distinguishable from it by the shape of spectacles-shaped sclerite (Fig. 21).

***Pullimosina vulgesta* Roháček, 2001**

(Japanese name: Kuro-karekusa-funkobae)

(Fig. 5)

*Pullimosina (Pullimosina) vulgesta* Roháček, 2001: 474.

*Diagnosis*. Body length 1.2–1.5 mm; general color dark brown; lunule and face dark brown; 3 *if*, middle pair somewhat enlarged; legs including fore coxa dark brown; distance between crossveins *r-m* and *dm-cu* about 1.5 times as long as *dm-cu* (Fig. 5), discal cell broad; abdominal syntergite 1+2 with a medial triangular pale pigmented area; male sternite 5 with a pair of small thorn-like projections; surstylus with dense setae; spermathecae tire-shaped.

*Specimens examined*. 1♂, Sekihoku Pass, Hokkaido, Aug. 14, 1982, T. Hayashi; 1♂, Shikaribetsu, Tokachi, Hokkaido, Aug. 28, 1995, T. Hayashi; 2♂, Obihiro, Tokachi, Hokkaido, Aug. 25–27, 1995, T. Hayashi; 2♂, 1♀, Hiroo, Tokachi, Hokkaido, Aug. 29, 1995, T. Hayashi; 2♂, 4♀, Jozankei, Sapporo, Ishikari, Hokkaido, Sept. 2, 1995, T. Hayashi; 1♀, Mt. Yokotsudake, Nanae, Oshima, Hokkaido, Aug. 19, 1982, T. Hayashi; 6♀, Mt. Myoko, Niigata, June 29–July 2, 1984, T. Hayashi; 1♂, Mt. Norikuradake, Azumi-village, Nagano, June 25–26, 1988, T. Hayashi; 1♂, 7♀, Kamikochi, Azumi village, Nagano, June 24–27, 1988, T. Hayashi; 1♂, Shirahone Spa, Azumi-village, Nagano, June 25, 1988, T. Hayashi; 1♂, 1♀, Daimon Pass, Nagato, Nagano, July 23, 1986, T. Hayashi; 2♂, 3♀, Moroyama, Iruma-Gun, Saitama, July 29, 1986, T. Hayashi; 1♂, 2♀, ditto, April 4, 1988, T. Hayashi; 18♂, 21♀, ditto, May 24–31, 1988, T. Hayashi; 2♂, 1♀, ditto, July 1, 1991, T. Hayashi; 5♂, 7♀, Mt. Kumotori, 1,150 m, Okutama, Tokyo, July 30, 1986, T. Hayashi; 1♀, ditto, July 28, 1991, T. Hayashi; 1♂, ditto, April 28, 1992, T. Hayashi; 1♂, 1♀, ditto, July 21, 1995, T. Hayashi; 1♂, Urayasu, Chiba, July 24, 1985, T. Hayashi; 7♂, 5♀, Shibusawa, Tanzawa, Kanagawa, July 12–19, 1985, T. Hayashi; 1♀, Taishakukyo, 400 m, Tojo-cho, Hiroshima, June 6, 1997, T. Hayashi; 4♂, 3♀, Mt. Kurodake, Oita, June 10, 1972, K. Kanmiya; 1♀, Mt.

Hone, Oita, June 16, 1970, K. Kanmiya; 1♂, 1♀, Uchinomaki, Mt. Aso, Kumamoto, July 18, 1970, K. Kanmiya.

*Distribution.* Europe, Russia, North Korea and Japan (Hokkaido, Honshu and Kyushu).

*Remarks.* This is the commonest species of the genus *Pullimosina* in Japan. It is easily distinguishable from the other Japanese congeners by its entirely dark brown fore coxa.

#### ACKNOWLEDGEMENTS

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